Friends of Merrymeeting Bay

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Federal Communications Commission
445 12th Street SW
Washington, DC 20554

RE: Accelerating Wireless Broadband Deployment by Removing Barriers To Infrastructure Investment--WT Docket No. 17-79--Request for Reconsideration and Stay

Dear Sir/Madam:

Friends of Merrymeeting Bay (FOMB), a membership organization of 450 households in mid-coast Maine hereby requests reconsideration and a stay of the Federal Communications Commission's March 30, 2018 decision in the above-referenced matter. The Order dispenses with pre-deployment environmental and historic preservation reviews of many next generation wireless facilities.

FOMB's mission is to preserve, protect and enhance the unique ecosystems of Merrymeeting Bay largely through research, advocacy, education and land conservation. Merrymeeting Bay, a tidal riverine inland delta at the confluence of six rivers, drains 38% of Maine waters. The Bay is the only water body in the northeast providing nursery and spawning habitat to all 12 species of diadromous fish in the Gulf of Maine. It is home to a dozen rare plants, the largest staging ground in the NE for migratory waterfowl and epicenter of bald eagle recovery in Maine. FOMB has protected over 1,500 acres of land and 11 miles of shoreline and regularly provides educational opportunities to approximately 2,000 children. Merrymeeting Bay, filled with wild rice and other feed, is recognized worldwide for its bird life and has been designated a Globally Important Bird Area by the American Bird Conservancy. Birds can be particularly susceptible to disruption and damage from radiofrequency radiation exposure.

These facilities will emit high frequency radiation directly into peoples' homes. Scientific studies indicate radiation from these facilities may cause cancer and have other harmful impacts, especially in infants and young children. Many studies (2 attached) also indicate harm to wildlife and vegetation from radiofrequency radiation including that in the millimeter wavelengths, particularly harmful to small-bodied insects and birds, many of them critical pollinators. Elimination by the Commission of NEPA review options is an egregious error.

Notwithstanding this research, the Commission refused in its Order to evaluate health impacts of the emissions but relied on outdated regulations from 1996 based on data from the mid 1950's. The General Accountability Office issued a report in July 2012 recommending that the FCC update its radiofrequency exposure limits. To date, the Commission has not acted on GAO's recommendation and yet the FCC is moving forward without regard to the public welfare. This is unacceptable.

The next generation facilities also threaten the integrity of residential communities in other ways. For example, these next generation facilities may include towers up to 50 feet or more high with any number of antennas and associated equipment attached to the towers and on the adjacent ground. These facilities will have a direct impact on the aesthetics and property values of affected neighborhoods. Yet the Order does not consider these negative impacts.

Please reconsider the Order and issue a stay until the Commission completes its review of this and other requests for reconsideration. We incorporate by reference the Request for Reconsideration and Stay submitted in this proceeding by Edward B. Myers on May 29, 2018.

For the convenience of the Commission, we have submitted a copy of Mr. Myers' Request for Reconsideration and Stay with this filing.

Respectfully,

Ed Friedman, Chair
Friends of Merrymeeting Bay

Attachments:
Balmori, 2014 Electrosmog & Species Conservation
Thielens, et al., 2018 Insect Exposure to Radiofrequency Electromagnetic Fields
Between 2-120GHz.
Myers Request for Reconsideration
Myers Affadavit

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Electrosmog and species conservation

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H I G H L I G H T S

- Studies have shown effects in both animals and plants.
- Two thirds of the studies reported ecological effects.
- There is little research in this area and further research is needed.
- The technology must be safe.
- Controls should be introduced to mitigate the possible effects.

A R T I C L E   I N F O

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A B S T R A C T

Despite the widespread use of wireless telephone networks around the world, authorities and researchers have paid little attention to the potential harmful effects of mobile phone radiation on wildlife. This paper briefly reviews the available scientific information on this topic and recommends further studies and specific lines of research to confirm or refute the experimental results to date. Controls must be introduced and technology rendered safe for the environment, particularly, threatened species.

1. Introduction

Since the introduction of wireless telecommunication in the 1990s, the roll-out of mobile phone networks has led to a massive increase in environmental exposure to electromagnetic radiation (Levitt and Lai, 2010). The existing standards of public health protection only consider the effects of short-term thermal exposure; however, biological effects resulting from electromagnetic radiation might depend on dosage, including long-term chronic effects, and there is considerable experimental evidence for non-thermal biological effects (Hyland, 2000).

Researchers have also paid little attention to the potential harmful effects of microwaves from mobile phone mast radiation on wildlife. In about two thirds of the reviewed studies ecological effects of RF-EMF were reported, at high as well as at low dosages, linking the hazards with different modes and extents of exposure (Cucurachi et al., 2013). Although the species conservation implications are unclear, current evidence indicates that chronic exposure to electromagnetic radiation, at levels that are found in the environment, may particularly affect the immune, nervous, cardiovascular and reproductive systems (Balmori, 2009). Animals exposed to radiation emissions from nearby antennas may suffer changes in the enzyme activities that disappear when they are moved away from the source (Hässig et al., 2014), and underlying plausible explanations at the cellular level have been proposed in the findings (Pall, 2013).

There are now calls for action from government agencies, both in the U.S. and Europe. In the U.S. the Director of the Office of Environmental Policy and Compliance of the United States Department of the Interior sent a letter (Feb, 2014) to the National Telecommunications and Information Administration in the Department of Commerce which addressed the Interior Department's concern about the negative impact of cell tower radiation on the health of migratory birds and other wildlife. The Interior Department accused the Federal government of employing outdated radiation standards set by the Federal Communications Commission (FCC) (United States Department of the Interior, 2014). The European Environment Agency states: «Independent research into the many unknowns about the biological and ecological effects of RF are urgently needed, given the global exposure of over 5 billion people and many other species, especially those, like bees and some birds whose navigation systems are possibly being affected

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by such radiations and effects on breeding of wild birds» (European Environment Agency, 2013).

The following are some of the potential effects of anthropogenic electromagnetic radiation on wildlife:

1.1. Effects on behaviour and navigation

Insects and birds are extremely sensitive to electromagnetic fields. Insects use several senses to forage, detecting visual cues such as colour, shape, etc., but also floral electric fields can be discriminated by bumblebees and this sensory modality may facilitate rapid and dynamic communication between flowers and their pollinators (Clarke et al., 2013). In an electric field of about 1 V/m, the microwaves may have a disastrous impact on a wide range of insects using olfactory and/or visual memory (i.e., on bees and ants). This experimentally generated electromagnetic field had a realistic (and even lower) power intensity than those usually encountered by living organisms near phone masts (Cammaerts et al., 2012), and, for this reason, the insects can be used as bioindicators to reveal biological effects from some wireless apparatus (Cammaerts and Johansson, 2013). The audiograms and spectrograms revealed that active mobile phone handsets had a dramatic impact on the behaviour of the bees, namely, by inducing the worker piping signal (in natural conditions, worker piping either announces the swarming process of the bee colony or is a signal of a disturbed bee colony) (Favre, 2011). The migratory birds (*Erithacus rubecula*) are also unable to use their magnetic compass in the presence of urban electromagnetic noise and fully double-blinded tests document a reproducible effect of anthropogenic electromagnetic noise on birds (Engels et al., 2014).

1.2. Effects on distribution and habitat loss

A possible effect of long-term exposure to low-intensity electromagnetic radiation from mobile phone base stations on the number of house sparrows (*Passer domesticus*) was studied in Belgium and Spain and both studies reached the same conclusion: fewer house sparrows were seen at locations where electric fields were stronger (Everaert and Bauwens, 2007; Balmori and Hallberg, 2007). In large cities, such as London, a huge decline in some house sparrow populations has been found in the last 15–20 years (De Laet and Summers-Smith, 2007), so the possible relationship between this decrease and the proliferation and increase in electromagnetic radiation as one of several factors at play should be thoroughly investigated. In a study looking at factors associated with extirpation of sage-grouse (*Centrocercus* sp.), of the five variables most associated with extirpated and occupied ranges, one was the distance to base stations, and this strong association was an especially interesting result (Wisdom et al., 2011). Bat activity is also significantly reduced in habitats exposed to electromagnetic radiation, which elicit an aversive behavioural response and can be used as a possible method of discouraging bats from approaching wind turbines to prevent fatalities (Nicholls and Racey, 2007, 2009).

1.3. Reproduction effects and recruitment reduction

In several research conducted with different animal groups, the exposure to microwave radiations from mobile phone (GSM) base stations caused sperm head abnormalities in mammals, and the radiation from a mobile phone decreased the ovarian development in insects, the amino acid composition changed and the DNA was damaged (Otitoloju et al., 2010; Lu et al., 2010; Panagopoulos, 2012). However, other studies have not found effects on the reproductive capacity of invertebrates exposed to such radiation (Vijver et al., 2013). There are some scientific views that deny any evidence or possibility of effects on human reproduction (Lerchl, 2013), which goes against most of what has been published on this topic (Adams et al., 2014).

In the vicinity of mobile phone base stations, it is possible that microwaves are interfering with the reproduction of birds such as storks and may affect the development and increase the mortality rate of exposed amphibians (Balmori, 2005, 2010). For instance, in chicken eggs exposed over the entire incubation period in laboratory, a significantly higher percentage of embryo mortality was observed (Batellier et al., 2008), although other studies have shown lack of adverse effects of this radiation on rat foetuses (Takahashi et al., 2009).

1.4. Adverse influence of radio-frequency background on trees and plants

A very limited number of studies have addressed the effects of electromagnetic radiation on plants. The findings of these studies indicate that the effects depend on the plant family, growth stage involved and the radiation characteristics, among other factors (Jayasanka and Asaeda, 2013). High-frequency electromagnetic fields alter the chlorophyll in black locust (*Robinia pseudoacacia*) seedlings and in duckweeds (*Lemna minor*) exposed (Sandu et al., 2005; Jayasanka et al., 2013). In tomato plants (*Lycopersicon esculentum*), which were exposed to low-level (5 V/m) electromagnetic fields for a short period (10 min), changes were found in the abundance of three specific mRNAs after exposure, strongly suggesting that they were the direct consequence of application of radio-frequency fields (Roux et al., 2007). The similarities of the changes to wound responses suggest that this radiation is perceived by plants as an injurious stimulus and causes them cell stress in the vicinity of radio-frequency irradiating antennas (Monselise et al., 2011). On 18 February, 2011, the first symposium on this topic, ¨The effect of electromagnetic radiation on trees¨, which presented results showing disturbing effects on trees, was held in the Netherlands (http://www.boomaantastingen.nl/).

2. Conclusion

At the present time, there are reasonable grounds for believing that microwave radiation constitutes an environmental and health hazard. It is necessary to open specific lines of research to confirm or refute the experimental results cited above, since similar findings were obtained in studies with cattle (Hässig et al., 2014) and humans (Khurana et al., 2010; Dode et al., 2011; Gómez-Perretta et al., 2013), although some governmental reports denied that electromagnetic radiation has adverse effects on human health (e.g. ARPANSA, 2014).

Electromagnetic radiation is among the potential pollutants with an ability to affect wildlife adversely. It is therefore a new area of enquiry deserving of immediate funding and research (Levitt and Lai, 2010). Despite its remarkable expansion in the last twenty years, the rate of scientific activity on the effects of phone masts on wildlife has been very small compared with topics like roads, power lines or wind turbines. The few studies that have been conducted address the impact of collisions (Longcore et al., 2012, 2013), but not the second significant issue associated with phone masts that involves the effects from non-ionising electromagnetic radiation (United States Department of the Interior, 2014). Concerning the exposure to electromagnetic fields, the precautionary principle is needed and should be applied to protect species from environmental non-thermal effects (Zinelis, 2010). Controls must be introduced and technology rendered safe to the environment, since this new ubiquitous and invisible pollutant could deplete the efforts devoted to species conservation.

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Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz

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Insects are continually exposed to Radio-Frequency (RF) electromagnetic fields at different frequencies. The range of frequencies used for wireless telecommunication systems will increase in the near future from below 6 GHz (2 G, 3 G, 4 G, and WiFi) to frequencies up to 120 GHz (5 G). This paper is the first to report the absorbed RF electromagnetic power in four different types of insects as a function of frequency from 2 GHz to 120 GHz. A set of insect models was obtained using novel Micro-CT (computer tomography) imaging. These models were used for the first time in finite-difference time-domain electromagnetic simulations. All insects showed a dependence of the absorbed power on the frequency. All insects showed a general increase in absorbed RF power at and above 6 GHz, in comparison to the absorbed RF power below 6 GHz. Our simulations showed that a shift of 10% of the incident power density to frequencies above 6 GHz would lead to an increase in absorbed power between 3–370%.

Radio-Frequency (RF) electromagnetic fields (EMFs) enable wireless communication between billions of users worldwide. Presently, this mainly occurs at RF frequencies located between 100 MHz and 6 GHz[1]. Wireless telecommunication base stations are the dominant sources of outdoor RF-EMFs[1]. Humans and animals alike are exposed to these fields, which are partially absorbed by their bodies, e.g. reported for insects in[2]. The absorbed dose depends on the frequency[3,4], and can be strongly enhanced when a full-body or partial-body resonance occurs[3]. This RF absorption has already been studied for particular insects at different individual frequencies: 27 MHz[5,6], 900–915 MHz[6–8], and 2450 MHz[9].

This absorption may cause dielectric heating[10]. Heating affects insect behavior, physiology, and morphology[11]. Reviews of studies that investigate RF heating of insects are presented in[12–14]. Other authors focus on environmental RF exposure of insects[15,16] or expose insects to RF radiation in order to investigate potential biological effects[17,18]. Studies on non-thermal effects of exposure to RF-EMF exist:[19] presents a review of potential mechanisms for non-thermal effects and a review of non-thermal effects of EMF exposure wildlife is presented in[20]. Most existing studies focus on RF frequencies below 6 GHz. The same frequencies at which the current generations of telecommunication operate[1]. However, due to an increased demand in bandwidth, the general expectation is that the next generation of telecommunication frequencies will operate at so-called millimeter-wavelengths: 30–300 GHz[21,22]. Therefore, future wavelengths of the electromagnetic fields used for the wireless telecommunication systems will decrease and become comparable to the body size of insects and therefore, the absorption of RF-EMFs in insects is expected to increase. Absorption of RF energy was demonstrated in insects between 10–50 GHz[23], but no comparison was demonstrated with the RF absorption at frequencies below 10 GHz. The radar cross section of insects has been determined above 10 GHz, but this quantity includes both scattering and absorption[24]. It is currently unknown how the total absorbed RF power in insects depends on the frequency to which they are exposed.

Most of the previously cited studies depend on measurements using RF equipment such as antennas, waveguides, and dielectric probes to determine the absorption of RF-EMFs in insects. An alternative approach would

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be to use numerical simulations. This approach was previously used to determine the absorption of RF-EMFs in humans and requires numerical models or phantoms[25–28].

Techniques for creating heterogeneous, three-dimensional insect models with micrometer resolution have previously been demonstrated in[29].

However, up to now, insect phantoms have not been used in electromagnetic simulations.

The aims of this study were to, for the first time, numerically evaluate RF-EMF absorption in real models of insects and to determine a potential difference in RF absorption in insects due to current and future telecommunication networks. To this aim, we studied the absorbed RF power in four different insect models obtained using micro-CT imaging as a function of frequency in a broad band, 2 GHz up to 120 GHz, that covers both the existing and the foreseen future wireless telecommunication bands. Voxelling precision in the order of 5–20 μm is obtained, required for accurate electromagnetic simulations.

Methods

The Insects. *Australian Stingless Bee (Tetragonula carbonaria).* This bee *(Tetragonula carbonaria)* is native to Australia. The scanned insect was approximately 4.5 mm long, 3.0 mm wide, and has a mass of 2.5 mg.

Western Honeybee (Apis mellifera). This bee *(Apis mellifera)* originated in Europe. It is the most common honeybee. The studied specimen was approximately 11.0 mm long, 5.0 mm wide, and has a mass of 900 mg.

Desert Locust (Schistocerca gregaria). The studied locust *(Schistocerca gregaria)* was approximately 55.0 mm long, 18.0 mm wide, and has an approximate mass of 3.5 g.

Beetle (Geotrupes stercorarius). The studied beetle is a dor beetle *(Geotrupes stercorarius)*. The beetle was found and scanned (see below) at Aberdeen University in Scotland. The beetle's length was 8.01 mm and its width is 4.5 mm. The insect's mass was not measured at the time of scanning. The average mass of a dor beetle is 220 mg[30].

Scanning Methods. *Australian Stingless Bee.* MicroCT scans were performed with a Skyscan 1172 high-resolution MicroCT system (Bruker MicroCT, Kontich, Belgium). This system has a sealed, microfocus x-ray tube with a 5 μm focal spot size. The x-rays were produced by exposing the anode to 40 kV at 100 μA. Prior to scanning, the sample containing the insect was placed on the pedestal between the x-ray source and the CCD detector. After positioning the sample, 600 2D x-ray images over 180° were captured by exposing the sample and then rotating it to the next exposure position with a slice-to-slice rotation distance of 2 μm, and a total acquisition time of approximately 60 min: each 2D image represents one slice. The scanner software then converted each slice to axial orientation and created 998 bitmap images (16 bit grey scale) which were stored for 2D viewing and 3D reconstruction as a 983 Mb dataset. The resulting isotropic voxel size was 5 μm.

Western Honeybee. A bench-top MicroCT scanner (Quantum GX MicroCT Imaging System, PerkinElmer, Hopkinton, MA, USA) at the Western Sydney University National Imaging Facility (Sydney, Australia) was used to scan the bee. The following parameters were used: 50 kVp, 80 μA, high resolution 2048 $\times$ 2048 pixels image matrix, with 20 μm isotropic voxel size. Scanning time was 3.0 s for each of the 180 projections with 3.0 s rotation in between each projection. The total scan time was approximately 18 min per whole bee. The Quantum GX, bench-top MicroCT scanner's software was used to reconstruct the 180 projection images and then to convert them into a 2D rendered image stack of 512, 16 bit bitmap images. Bee volume data were then acquired by loading the image stack into BeeView volume rendering software (DISECT Systems Ltd, Suffolk, UK).

Desert Locust. The locust was suspended vertically in a 30-mm acrylic tube that was mounted tightly on the micro-CT's inclination stage. This stage was used to ensure that the rotation axis was at 90° to the x-ray source. Exposure factors were: 50 kVp and 198 μA. The data were isotropic 16 bit 2000 $\times$ 2000 pixels with 1048 rows. Pixel size was 10.469 μm. Skyscan NRecon software version 1.5.1.4 (Bruker, Kontich, Belgium) was used to reconstruct the projection data[31]. Having obtained the projection data in the form of an image stack of 2-D TIFF files the data was viewed as a 3-D model using Disect software, DISECT Systems[29].

Beetle. The beetle was scanned at Aberdeen University on a Skyscan 1072 Micro-CT scanner (Bruker, Kontich, Belgium) using 50 kV and 197 μA, at 10.46 μm pixels isotropically. The images were then converted to axial slices using Skyscan's NRECON software (version 1.4). The produced axial image stack was further processed and analyzed using the Tomomask software (www.tomomask.com) before viewing in disect.

Development of 3D models. 3D models of the insects were created using the software TomoMask (www.tomomask.com). The image stack for each insect was firstly imported into the software together with details of the pixel and slice spacing. Regions to be converted into a 3D model are defined in TomoMask by drawing a mask of the wanted regions on each slice. This can be done automatically using the Luminance mask function which creates a mask based on the grey level of the pixels. The threshold values for the mask are set to include all of the insect tissue but will exclude air cavities and very fine structures, such as wings. The 3D model (generated by a marching cubes algorithm[32]) is exported as an STL (STereo Lithography)[33] format file. STL files describe only the surface geometry of a three-dimensional object without any representation of colour or texture. Typically some smoothing of the models is required and this is realized using the Taubin λ/μ smoothing scheme[34] implemented in MeshLab[35]. The Taubin method is good at removing noise whilst preserving shapes and features. Dimensions of the models and mesh integrity are finally checked (and corrected if necessary) using Netfabb (Autodesk, San Rafael, CA, USA).

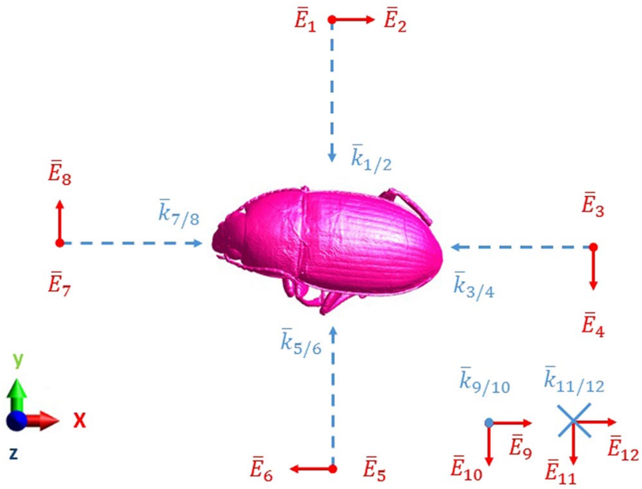

Figure 1. Illustration of the RF-EMF exposure set up. The insect (Beetle shown here in pink) is exposed to twelve RF plane waves incident from six directions along the positive and negative directions of the Cartesian axes shown on the bottom left with two orthogonal polarizations for each direction. The twelve wave vectors $\overline{k}_{i/j}$ are indicated in blue (dashed arrows), while the polarization of the incident electric fields $\overline{E}_i$ are indicated in red. i and j indicate the configuration number, from 1 to 12.

Dielectric Properties. The propagation of EMFs inside and around the obtained 3D insect phantoms will depend on their dielectric properties: the relative permittivity (ε_r) and conductivity (σ). In this study, we have executed and relied on a literature review of previous measurements of dielectric properties of insects, predominantly using the coaxial-line probe method[36]. There exist alternative methods. A toroidal resonator was used to determine the dielectric properties of two insects at 2370 MHz[37]. Dielectric properties of Rice Weevils (Sitophilus oryzae) are obtained using the coaxial probe method for frequencies from 5×10^4–2×10^{10} Hz[2]. The same technique was used on three other insects: the Red Flour Beetle *(Tribolium castaneum)*, the Sawtooth Grain Beetle *(Oryzaephilus surinamensis)*, and the Lesser Grain Borer *(Rhyzopertha dominica)*, from 0.2–20 GHz[36]. The same method was also used to measure dielectric properties of four insects: the Codling Moth *(Cydia pomonella)*, the Indian Mealmoth *(Plodia interpunctella)*, the Mexican fruit fly *(Anastrepha ludens)*, and the Navel Orange Worm *(Amyelois transitella)* from 27–1800 MHz[6]. Coaxial measurements on a Colorado Beetle *(Leptinotarsa decemlineata)* were performed from 0.1–26.5 GHz and used to derive a fit to the measurement data[38].

We have pooled the data series, real and imaginary part of ε_r as a function of frequency, obtained by[6,36,38] and interpolated them from 2–120 GHz in steps of 0.1 GHz. We have then averaged over all available data at every frequency steps considered in the simulations.

Numerical Simulations. The Finite-Difference Time-Domain (FDTD) technique implemented in the commercial simulation software Sim4life (ZMT, Zurich, Switzerland) is used to evaluate absorption of RF-EMFs inside the insects as a function of frequency. This technique is commonly used to determine absorption of RF-EMF in heterogeneous human body models[3]. The FDTD method requires one to discretize the simulation domain using a three-dimensional grid. The simulation domain is divided in a number of cubes (discretized) with spatial extends that are defined by the spatial grid steps in the simulation domain. RF-EMFs can be incident from any direction. Therefore, we have chosen to work with 12 incident plane waves with a root-mean-squared electric field strength of 1 V/m, illustrated in Fig. 1, along 6 directions defined by Cartesian axes, with two orthogonal polarizations of the incident RF-EMFs along each axis.

The exposure was modeled using single frequency sinusoidal (harmonic) continuous plane waves. We did not take into account a potential modulation of the waves, which might be present in real telecommunication signals. This same technique has previously been used to evaluate the frequency dependence of RF absorption in the human body[3]. Simulations were executed for sinusoidal plane waves at 7 harmonic (single) frequencies: 2, 3, 6, 12, 24, 60, and 120 GHz. This resulted in a dataset of 4 (insects) $\times$7 (frequencies) $\times$12 (plane waves: 6 angles of incidence $\times$2 polarizations) = 336 simulations.

The Australian Stingless Bee, the Western Honey Bee, and the Beetle were discretized with steps of 0.05 mm in each direction, while the larger Locust was discretized with steps of 0.2 mm in each direction at frequencies below 60 GHz and a step of 0.1 mm at 60 GHz and 120 GHz. These spatial steps provided a balance between simulation time (which depends on the number of grid steps and the relative grid step size in comparison to the wavelength) and spatial resolution of the insects' features. A stable FDTD simulation yields reproducible results that converge over time. The quantities determined using the FDTD algorithm should converge to a constant value as the simulation progresses in time. After a certain simulation time, these values will remain constant, this is referred to as a steady state. A grid step smaller than one tenth of the smallest wavelength in the simulation domain is necessary for a stable FDTD simulation[39]. This is a requirement of the FDTD algorithm[39] and remains valid in all our

Insect	L (mm)	W (mm)	H (mm)	D (mm)	Range λ_{max} (mm)
Beetle	8.01	4.5	4.29	10.14	5–25
Australian Stingless Bee	4.89	3.39	3.99	7.16	2.5–12.5
Western Honey Bee	11	4.154	4.044	12.43	12.5–50
Locust	54.99	18.49	17.55	60.61	25–100

Table 1. Dimensions of the studied insect models along the different axes shown in Fig. 1. L, W, and H, are the dimensions in the X, Y, and Z, directions, respectively. D is the size of the diagonal of the brick with dimensions L × W × H. The final column lists the range in wavelengths where the maximal $P_{abs}(\lambda_{max})$ will be located.

simulations. The smallest wavelength in tissue $(\lambda/\sqrt{\varepsilon_r})$ is 1.1 mm at 120 GHz. At this frequency we used grid steps of 0.05 mm ($\leq 0.045 \times \lambda/\sqrt{\varepsilon_r}$) for all insects, except for the locust where we used 0.1 mm ($\leq 0.09 \times \lambda/\sqrt{\varepsilon_r}$).

We ensured that the grid steps were small enough to prevent disconnections in the models. All insects were considered as consisting of homogeneous tissue with frequency-dependent dielectric parameters obtained as an average of the values we found in literature (previous section). This is an approximation, since real insects have heterogeneous tissue properties. Each simulation was executed until a steady state was reached. The number of periods necessary to reach a steady state solution depended on the studied insect and frequency and was between 20–80. This was controlled by temporal monitoring of the electric field strength along a line in the simulation domain until it reached a steady state. Additionally, the chosen number of simulation periods allowed for propagation of at least 3 times the length of the insects' diagonal (see Table 1).

After every simulation, the absorbed RF-EMF power (P_{abs}) in the insect was extracted. The P_{abs} is calculated as the product of the conductivity and the squared electric field strength integrated over the volume of the insect. The whole-body averaged specific absorption rate can be obtained by dividing P_{abs} by the insects' mass (assuming a homogeneous mass density). Absorbed RF-EMF power is generally used as a proxy for dielectric tissue heating[10]. We have not executed full thermal simulations due to uncertainties on the specific heat capacities of the insects and heat dissipation mechanisms.

Results

3D Models. Figure 2 shows the used 3D models obtained using micro-CT scanning of four insects.

Dielectric Properties. Figure 3 shows the imaginary and real parts of ε_r obtained by averaging those values that were available in[6,36,38]. The real part is positive and decreases with frequency, while the imaginary part is negative (lossy media) and shows a minimum between 10–20 GHz. These are in line with the Debye dielectric curves proposed in[38]. Figure 3 adds further perspective by showing the corresponding conductivity in (S/m) and the RF penetration depth.

Numerical Simulations. Figure 4 illustrates the frequency dependence of the absorption of RF-EMFs in the Western Honeybee in terms of the ratio of the electric field strength inside the insect to the maximum electric field in the simulation domain. At the currently used frequencies for telecommunication (<6 GHz), the wavelength is relatively large compared to the insects and the waves do not penetrate into the insects, which results in lower Pabs values. At 12–24 GHz, the fields penetrate more and more into the insect as the wavelength becomes comparable to the insects' size and the conductivity increases as well. At the highest studied frequencies, the fields penetrate less deep into the insect, but their amplitude is higher, resulting in a similar or slightly lower P_{abs}.

Figure 5 shows the P_{abs} linearly averaged over all twelve plane waves as a function of frequency for all studied insects. The absorbed power increases with increasing frequency from 2–6 GHz for all insects under exposure at a constant incident power density or incident electric field strength of 1 V/m. The absorbed power in the Locust, the largest studied insect, decreases slightly at the studied frequencies >6 GHz, but remains higher than at 2 and 3 GHz. The Western Honeybee shows an increase up to 12 GHz, followed by a slight decrease up to 120 GHz (Pabs remains more than 10× higher than <6 GHz). The smaller Australian Stingless Bee shows an increase of P_{abs} with frequency up to 60 GHz and a slight decrease at 120 GHz. The Pabs in the Beetle increases until 24 GHz and slightly decreases at higher frequencies.

Table 1 lists the dimensions of the different studied insects, compared to the wavelength λ-range in which the maximal Pabs will be located. The Pabs is simulated for discrete frequency steps. Therefore, the λ_{max} that corresponds to the maximum P_{abs} is located in between the wavelength steps right below and above the wavelength step that corresponds to the maximum simulated P_{abs}, see Fig. 4. The main diagonal of the insects' bounding box is within the range in which the wavelength of maximal absorption λ_{max} is located for three out of the four studied insects. This indicates that the absorption is (partly) determined by the size of the insects.

Numerical simulations are never the same as reality and there are always uncertainties associated with any EM simulation technique. We report the following sources of uncertainty: model variations and variation on dielectric properties.

The insect models are scanned with a resolution of 20 μm, 10.5 μm, 10.5 μm, and 5 μm, for the Honey Bee, the Locust, the Beetle, and the Australian Stingless Bee, respectively. These are 40%, 5–10%, 21%, and 10% of the spatial grid step used in the simulations of the Honey Bee (0.05 mm), the Locust (0.1–0.2 mm), the Beetle (0.05 mm), and the Australian Stingless Bee (0.05 mm), respectively. This indicates that the grid step is dominant

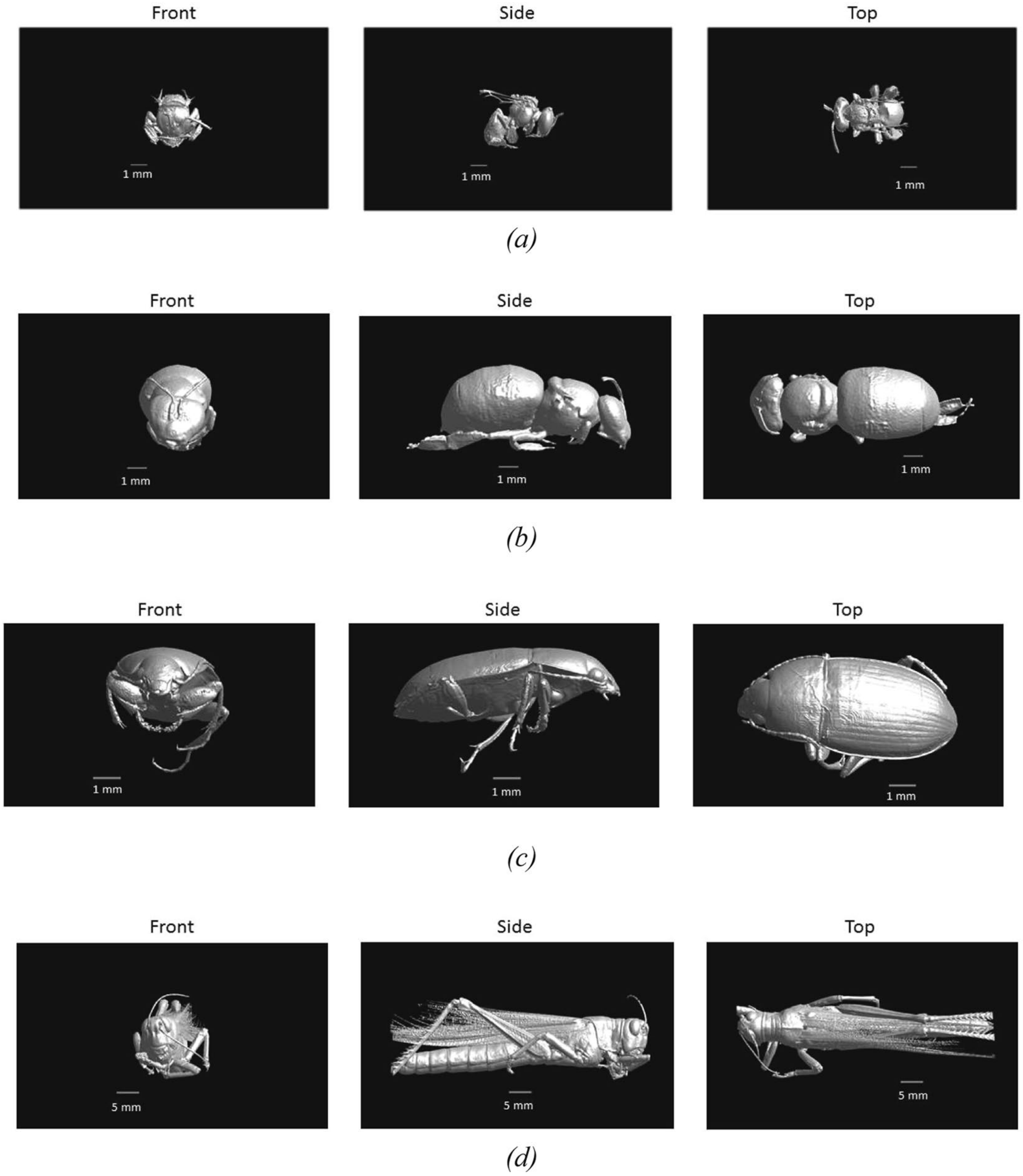

Figure 2. Frontal, side, and Top view of the four studied insects. (**a**) Australian Stingless Bee, (**b**) Western Honeybee, (**c**) Beetle, and (**d**) Locust.

in determining the spatial extends of the used models and not the resolution of the scanning method. In order to investigate the effect of the chosen grid step on the obtained P_{abs} values, we have executed the simulation with configuration 9 (Fig. 1) at 120 GHz with a maximal grid step that is half of the grid step used in our simulations using all four studied insects. We assume the largest effect of grid step size at the highest frequency. A 50% reduction in grid step (more accurate modelling) resulted in deviations of 1.1%, 2.5%, 0.32%, and 0.24%, for the Honey Bee, the Locust, the Beetle, and the Australian Stingless Bee, respectively. These deviations are small in comparison to the variations as a function of frequency, see Fig. 5, and the uncertainty caused by the dielectric parameters, see the next paragraph.

Deviations on ε_r will influence P_{abs}: the real part of ε_r will (partly) determine the magnitude of the internal electric fields, while P_{abs} scales linearly with conductivity. The maximal relative deviations on the real and imaginary part of ε_r are (−13, +36)% and (−40, +36)%, respectively, which occur between 2–3 GHz. We have executed a simulation using configuration 1 at 2 GHz for the Beetle phantom, shown in Fig. 1, using five different sets of dielectric properties accounting for the deviations mentioned above: $[Re(\varepsilon_r), Im(\varepsilon_r)]$, $[1.36 \times Re(\varepsilon_r), 1.36 \times Im(\varepsilon_r)]$, $[1.36 \times Re(\varepsilon_r), 0.6 \times Im(\varepsilon_r)]$, $[0.87 \times Re(\varepsilon_r), 1.36 \times Im(\varepsilon_r)]$, and $[0.87 \times Re(\varepsilon_r), 0.6 \times Im(\varepsilon_r)]$, in order to determine the effect of the uncertainty of dielectric properties on P_{abs}. We found maximal relative deviations of [−57, +59]% relative to the value obtained using $[Re(\varepsilon_r), Im(\varepsilon_r)]$. These deviations are small in comparison to the variations as a function of frequency, see Fig. 5.

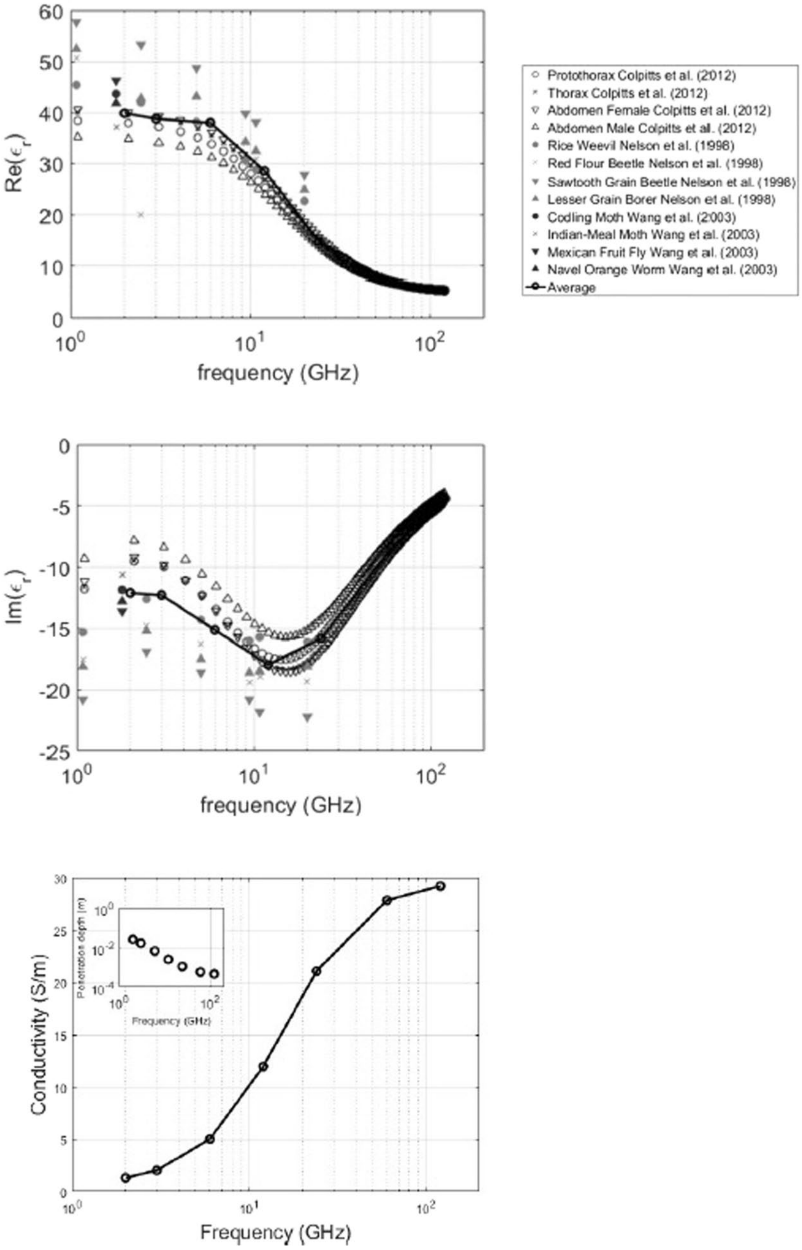

Figure 3. From top to bottom: Real part of the used dielectric permittivity, Imaginary part of the used dielectric permittivity, and conductivity with RF-EMF penetration depth as an inset. Markers show measurements obtained from literature. The black line with circular markers shows the average over the available data series at those frequencies.

Previous studies have indicated that large differences in dielectric properties might exist between adult insects and larvae[40]. Worst-case deviations of $[Re(\varepsilon_r)/7, Im(\varepsilon_r)/5]$ at 5 GHz and $[Re(\varepsilon_r)/6, Im(\varepsilon_r)/8]$ at 15 GHz were observed in[40]. We have executed simulations of configuration 1 using the beetle (shown in Fig. 1) at 6 GHz and 12 GHz where we have applied these reduced dielectric parameters. We found an increase in P_{abs} of 4% at 6 GHz and a decrease of 66% in P_{abs} at 12 GHz. Figure 5 shows that these variations are smaller than the variations we observed for varying angles of incidence at a fixed frequency.

Discussion

In this study, we have evaluated the absorption of RF-EMFs in insects as a function of frequency. To this aim, we obtained novel insect models using micro-CT imaging, which were used in FDTD simulations. In these simulations they were exposed to plane waves incident from six directions and two polarizations.

The frequency of the incident harmonic plane waves was varied from 2–120 GHz and resulted in P_{abs} as a function of frequency.

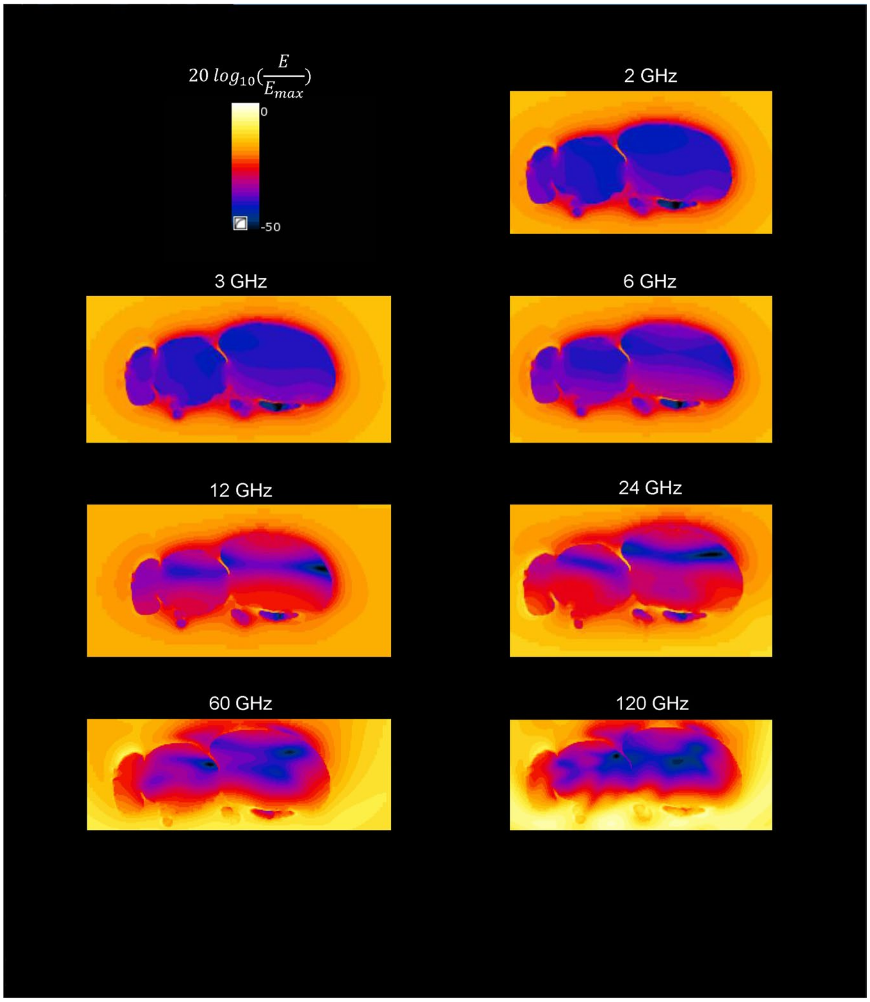

Figure 4. Normalized Electric field strength (dB) in a mid-transverse cross section of the Western Honey Bee as a function of frequency for a single plane wave incident from below with polarization orthogonal to the shown plane (No. 5 in Fig. 1). Normalization was executed for each simulation separately, i.e. E_{max} can be different in each subfigure.

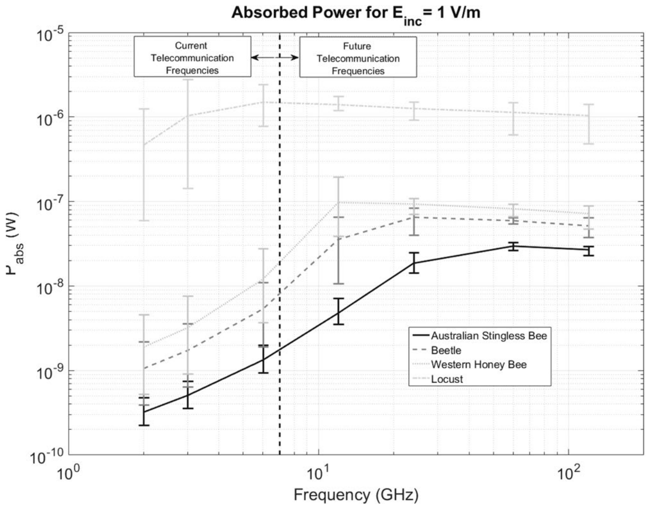

Figure 5. P_{abs} for an incident field strength of 1 V/m as a function of frequency for all studied insects. The markers indicate the average over all twelve plane waves at each of the simulated frequencies, while the whiskers indicate the minimal and maximal Pabs values obtained during the simulations.

Previous studies have shown that Micro-CT imaging can be successfully used as a non-invasive technique to accurately scan insects and develop 3D models with micrometer resolution[29,41]. Models with micrometer resolution are necessary to obtain accurate results in FDTD simulations at 120 GHz ($\lambda = 2.5$ mm), since a discretization of $\lambda/10$ in the simulation domain is recommended to obtain stable results[39]. It has been demonstrated for human body models that real anatomical models generally result in more accurate and realistic results than approximate models[3,25,28]. Therefore, we also expect our real insect models to lead to more accurate results regarding absorbed RF power than, for example, cylindrical phantoms with different diameters and heights, which were used in previous studies of RF exposure of insects[42].

The dielectric properties that were assigned to the studied insects were obtained from an interpolation of data found in literature. Ideally, the simulations should be executed with dielectric properties measured in the actual insects that were used to create the models. Figure 3 does show that most insects show a similar frequency behavior, which we have averaged by using an interpolation over values listed in literature.

Our numerical simulations show that the absorption of RF-EMFs in the insect models is frequency dependent. The P_{abs} is smallest at the lowest studied frequencies 2 GHz and 3 GHz, for all insects. P_{abs} shows a peak, which depends on the size and/or mass of the insects. The three smaller insects show their maximum at a frequency higher than 6 GHz: 60 GHz, 24 GHz, and 12 GHz for the Australian Stingless Bee, the Beetle, and the Honey Bee, respectively. The Locust shows a maximum at 6 GHz. We attribute this frequency behavior to two effects: first, the efficiency of RF-EMFs coupling into the models is maximal at frequencies comparable to the length of the insects, as Table 1 illustrates. Second, the interpolation of the imaginary part of the dielectric constant shows a minimum at 12 GHz, which means that RF-EMFs can cause the highest local SAR at these frequencies, see Fig. 3.

The difference between the maximal and minimal P_{abs} found at one frequency for different angles of incidence is smaller at the frequencies >6 GHz, than at the frequencies <6 GHz, in particular for the three smaller insects. This indicates that the angle of incidence is less important at these frequencies. This suggests that there is little difference in efficiency when depositing RF power in the studied insects with a single plane wave compared to depositing the same power using uncorrelated sources or reflections coming from all directions. In this study, we have only used single plane-wave simulations to determine P_{abs}. The averaging over P_{abs} does not include interference effects, which might result in lower (destructive interference) or higher (constructive interference) bounds on the P_{abs} values shown in Fig. 5.

A similar frequency behavior (increase, peak, decrease, and dependency on body size) is observed in human body models[3,4]. However, at frequencies which are roughly a factor 100–1000 times lower, because the human body is approximately the same order of magnitude larger than that of the studied insects. For example, the heterogeneous adult human body model Duke shows an increase in Pabs from 10 MHz–80 MHz, a peak between 80 MHz–90 MHz, followed by a decrease in P_{abs} (and a second peak at higher frequencies)[3]. The smaller child phantom Thelonius shows an increase in Pabs from 10 MHz–100 MHz, a peak between 100 MHz–200 MHz, followed by a decrease in P_{abs}[3].

In order to quantify the effect of a shift to higher telecommunication frequencies on P_{abs}, one can use the data presented in Fig. 5. If we assume an incident $E_{rms} = 1$ V/m which is uniformly distributed over 2, 3, and 6 GHz, we find average P_{abs} values of 0.71 nW, 2.6 nW, 5.7 nW, and 990 nW, for the Australian Stingless Bee, the Beetle, the Honey Bee, and the Locust, respectively. If we assume that 10% of this incident field would be evenly distributed over the frequencies above 6 GHz, the P_{abs} increases to 2.6 nW, 7.7 nW, 14 nW, and 1.0 μW, for the Australian Stingless Bee, the Beetle, the Honey Bee, and the Locust, respectively. These are increases of 370%, 290%, 240%, and 3%, respectively. Note that this is a conservative estimation of the increase in P_{abs}, since we assume a constant incident field and a uniform distribution of the currently used frequencies <6 GHz. Nowadays, most of the incident power density used for telecommunication is located at frequencies $\leq$2 GHz[1], where all insects show a minimal P_{abs}. In an isolated approximation (no convection or conduction) and under the assumption of unchanging mass and specific heat capacitance, the rate of temperature increase scales linearly with increasing P_{abs}. As an example, for the Australian Stingless Bee (mass = 2.5 mg) a P_{abs} of 3 × 10–8 W is estimated for an incident field strength of 1 V/m at 60 GHz. Under the assumption that the insect has a specific heat capacity equal to that of water (4179 J/K kg[43]), this RF-EMF exposure would result in a temperature increase of 3 × 10–6 K/s, in an isolated approximation.

Strengths and Limitations

Our paper has several clear strengths and contributions to the state of the art in literature. To our knowledge, this is the only paper in which real insects are used to create models for numerical simulations. Moreover, this is the first paper that investigates the exposure of electric fields with RF frequencies associated with 5 G wireless communication and that shows that the absorbed power in insects is expected to increase in unchanged environmental conditions with respect to the one of current wireless communication systems (3 G and 4 G). A disadvantage of our study is the use of homogeneous models in the simulations, whereas real insects will have heterogeneous tissue parameters. Variations on dielectric parameters can exist on a scale that is smaller than the spatial resolution that any scanning method can currently obtain[44]. The FDTD method requires a division of the simulation domain in a number of voxels, which each have to be assigned homogeneous dielectric properties[39]. Any numerical simulation will be an approximation of reality. To our knowledge, the FDTD method, although faced with uncertainties[3,39,44] is the best simulation method currently available to estimate the quantities studied in this manuscript. This paper is limited to electromagnetic dosimetry, which is focused on determining absorbed powers values. These can be used as an input in thermal modelling of the insects. However, a full thermal analysis was outside the scope of this paper. Finally, we have included variations in angles and polarizations of incident waves. However, we have only looked at a limited number of plane waves, whereas real exposure is composed of plane waves from any direction.

Future Research

In our future research, we would like to model more insects to get a better understanding of the frequency dependence of the absorbed RF-EMF power as a function of insect size. We would also like to develop heterogeneous insect models with tissue-specific dielectric parameters. Finally, our goal is to determine the effect of absorption of RF-EMFs on the core temperature of insects as a function of frequency. To this aim, we want to use infrared temperature measurements of insects exposed to high electromagnetic fields as function of frequency.

Conclusions

We investigated the absorbed radio-frequency electromagnetic power in four different real insects as a function of frequency from 2–120 GHz. Micro-CT imaging was used to obtain realistic models of real insects. These models were assigned dielectric parameters obtained from literature and used in finite-difference time-domain simulations. All insects show a dependence of the absorbed power on the frequency with a peak frequency that depends on their size and dielectric properties. The insects show a maximum in absorbed radio frequency power at wavelengths that are comparable to their body size. They show a general increase in absorbed radio-frequency power above 6 GHz (until the frequencies where the wavelengths are comparable to their body size), which indicates that if the used power densities do not decrease, but shift (partly) to higher frequencies, the absorption in the studied insects will increase as well. A shift of 10% of the incident power density to frequencies above 6 GHz would lead to an increase in absorbed power between 3–370%. This could lead to changes in insect behaviour, physiology, and morphology over time due to an increase in body temperatures, from dielectric heating. The studied insects that are smaller than 1 cm show a peak in absorption at frequencies (above 6 GHz), which are currently not often used for telecommunication, but are planned to be used in the next generation of wireless telecommunication systems. At frequencies above the peak frequency (smaller wavelengths) the absorbed power decreases slightly.

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Author Contributions

A.T. conducted the numerical simulations, analyzed the results, and drafted the manuscript, M.K.G., D.B., and, D.B.M. conducted the imaging and post processing of the imaging. W.J. and L.M. contributed to analyzing the methodology and results. All authors reviewed the manuscript and provided input to the different sections.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:

Accelerating Wireless Broadband	)	
Deployment by Removing Barriers	)	WT Docket No. 17-79
To Infrastructure Investment	)	

Request for Reconsideration and Stay

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May 29, 2018

I. Statement of Interest

This Request for Reconsideration and Stay (Request) is submitted in response to the Second Report and Order in this proceeding (Order)[1]. The Order was issued by the Federal Communications Commission (FCC) for the stated purpose of expediting the planned deployment of wireless facilities in the United States. In the Commission's zeal to expedite the deployment of wireless facilities, the Order for the first time exempts so-called "small" wireless facilities from the requirements of the National Environmental Policy Act of 1969, 42 U.S.C. § 4321 *et seq*. (NEPA), and the National Historic Preservation Act of 1966, 54 U.S.C. 300101 *et seq.* (NHPA).

The record indicates that (1) these so-called "small" wireless facilities, once deployed in residential areas, will number in the hundreds of thousands[2] and will consist of cell towers with heights up to 50 feet or more[3] bearing multiple antennas and associated equipment; and (2) these wireless facilities will use technologies that emit higher frequency radiation, possibly on a continuous or near continuous basis, than

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1 *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Second Report and Order, WT Docket No. 17-79 (adopted March 22, 2018; released March 30, 2018). See, 83 FR 19440 (May 3, 2018) (hereinafter "Order").

2 Order at para. 40: "Verizon states that next generation networks will require 10 to 100 times more antenna locations than previous 3G and 4G networks, while AT&T represents that carriers will deploy hundreds of thousands of wireless facilities- equal to or more than the number of macro facilities deployed over the last few decades."

3 The Order defines small wireless facilities in the following terms: (i) The facilities are mounted on structures 50 feet or less in height including their antennas…, or the facilities are mounted on structures no more than 10 percent taller than other adjacent structures, or the facilities do not extend existing structures on which they are located to a height of more than 50 feet or by more than 10 percent, *whichever is greater;* (ii) Each antenna associated with the deployment, *excluding the associated equipment*…, is no more than three cubic feet in volume; (iii) All other wireless equipment associated with the structure, including the wireless equipment associated with the antenna and any pre-existing associated equipment on the structure**,** is no more than 28 cubic feet in volume; (iv) The facilities do not require antenna structure registration under Part 17 of this chapter; (v) The facilities are not located on Tribal lands…; and (vi) The facilities do not result in human exposure to radiofrequency radiation in excess of the applicable safety standards specified in [47 CFR] § 1.1307(b) [emphasis added].

technologies currently in use, thereby creating a host of previously un-experienced deleterious, even dangerous, environmental impacts.

The undersigned, a citizen of the United States, is a resident of Montgomery County, Maryland. Like many state and local governments across the United States, Montgomery County is currently grappling with proposals by business interests to deploy wireless facilities directly in residential areas. The undersigned will be directly and indirectly affected by the negative impacts caused by deployment of wireless facilities in residential areas. Consequently, the undersigned has an interest in the outcome of this proceeding and for that reason submits this Request for Reconsideration and Stay.

II. Background

The comments submitted in this proceeding by major telecommunications companies, including AT&T, T-Mobile, and Verizon, attest to plans to deploy hundreds of thousands of new so-called "small" wireless facilities in residential communities across the United States. These wireless facilities will employ high frequency millimeter wave (mmW) spectrum that has only recently been permitted by the FCC without any review of the health and safety impacts from its use.[4] These wireless facilities will broadcast high radiofrequency (RF) waves in direct line-of-sight to residences whose occupants may not be aware of the new RF emissions coming into their homes and will have no effective means of shielding themselves from the radiation.[5] The health and safety standards for these emissions were promulgated in 1996 based largely on standards

[4] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, et seq.*, GN Docket No. 14-177, *et seq.,* Report and Order and Notice of Proposed Rulemaking (adopted July 14, 2016, released July 14, 2016), published in the Federal Register at 81 FR 58270 (August 24, 2016) at paragraph numbers 356 through 363 (expressly deferring consideration of health and safety impacts).

[5] Verizon Comments at 4-5.

developed in 1992. The General Accountability Office (GAO) in 2012 found that the existing standards may not reflect current knowledge and recommended that the FCC formally reassess the standards.[6] While the Commission opened a proceeding to reassess the standards in 2013,[7] it has not completed that reassessment and, in the Order in the present proceeding, continues to rely on the 1996 standards. The Order additionally defines so-called "small wireless facilities" to include cell towers up to 50 feet or more in height, multiple antennas no larger than 3 cubic feet in volume mounted on the towers, and associated equipment, each no larger than 28 cubic feet in volume, either mounted on the towers or secured on the adjacent ground. Subject to these height and volumetric limits, the Order rejects any cumulative limit on the total number of antennas and associated equipment placed on or near each tower.[8] The Order also does not attempt to define any limit on the distances between cell towers or the cumulative number of cell towers in a given area. Consequently, absent limits imposed by other governmental authorities, *i.e.* state or local agencies, there could be any number of antennas simultaneously broadcasting RF radiation into peoples' homes from a single tower and multiple installations of associated equipment on the towers and/or on the adjacent ground.

The Commission has coined a new term to describe industry plans for the installation of these multitudinous so-called "small" wireless facilities—"network

[6] General Accountability Office, Telecommunications--Exposure and Testing For Mobile Phones Should Be Reassessed (GAO-12-771) (July 2012).

[7] *Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields,* First Report and Order, Further Notice of Proposed Rulemaking, and Notice of Inquiry, ET Docket No. 03-137 (adopted March 27, 2013; released March 29, 2013). See, 78 FR 33634 (July 4, 2013).

[8] Order at para. 75.

densification".[9] With network densification, many residential communities across the country will be visited by a host of cell towers that will be significantly taller than the typical residential light pole. These small wireless towers also will be laden with associated equipment either attached to the towers and/or stationed on the adjacent ground.

Whereas, until now Commission regulations have required environmental (including health and safety) review prior to the deployment of so-called "small" wireless facilities, the Commission decided in the Order to remove that requirement for deployments of the so-called "small" wireless facilities, including cell towers, antennas, and associated equipment. The Commission found that the pre-deployment environmental review of these cell towers, antennas, and associated equipment is not required as a matter of law under NEPA or NHPA. The Commission also found in the Order that the pre-deployment environmental review of so-called "small" wireless facilities is not in the public interest.

III. Summary of Position

The undersigned respectfully maintains that the Commission has failed to meet its statutory obligation to examine whether its action in this proceeding will promote the safety of life and property, as required by Section 332(a)(1) of the Communications Act of 1934, 47 U.S.C. § 332(a)(1). The Commission also has erred in its determination that pre-deployment reviews of small wireless facilities are not required by Section 102 of NEPA (42 U.S.C. 4332(C)), Section 106 of NHPA (54 U.S.C. § 300320), and by the

[9] Order at para. 1.

public interest. Accordingly, the undersigned requests the Commission to reconsider the Order and stay its effectiveness, as further explained below.

IV. Discussion

A. The Commission's failure to meaningfully analyze whether the deployment of so-called "small" wireless facilities will promote the safety of life and property violates the Communications Act of 1934.

Section 332(a)(1) of the Communications Act of 1934 states that "[i]n taking actions to manage the spectrum to be made available for use by…private mobile services, the Commission shall consider…whether such actions will…promote the safety of life and property." Separately, Section 102(C) of NEPA, 42 U.S.C. 4332(C), requires the Commission to prepare an environmental impact statement (EIS) for major Federal actions significantly affecting the quality of the human environment.

While the Commission's statutory responsibility to consider the safety of life and property is legally independent of its NEPA responsibility, the Commission's established practice has been to consider issues bearing on the safety of life and property within the context of the performance of its NEPA responsibilities.[10] In the Order, the Commission analyzed its obligations under NEPA and concluded that NEPA does not apply to so-called "small" wireless facilities. The Commission also concluded that it need not conduct a review of health and safety impacts. See note 187 of the Order which states that the Commission is not addressing any potential effects from the provision of services, such as RF issues, *i.e.* issues dealing with the health and safety impacts due to RF emissions from small wireless facilities. Because the Commission concluded that so-called "small" wireless facilities were not subject to a NEPA pre-deployment review, it apparently concluded that a pre-deployment review of health and safety impacts also was unnecessary. In this regard, the Commission indicated that its existing health and safety

[10] Order at note 58.

regulations would provide adequate protection to the public following the deployment of so-called “small” wireless facilities.

Section 332(a)(1)’s plain language requires that, in managing spectrum, the Commission meaningfully review the impacts of its actions on life and property before they occur. Consequently, the Commission failed to meet its statutory responsibilities under Section 332(a)(1) of the Communications Act when it determined that deployment of wireless facilities could move forward without first determining whether the deployment would promote the safety of life and property. This obligation exists independent of NEPA and the position taken by the Commission that NEPA does not apply does not excuse the agency from performing its Section 332(a)(1) responsibility.

Furthermore, as discussed above, the GAO found in 2012 that the existing health and safety regulations are dated and may not reflect current knowledge about the health and safety impacts of RF emissions. Because the Order relies on these dated standards and stale scientific data to support a change in policy and regulations, the Commission’s action is arbitrary and capricious and unlawful.[11] Before implementing such a change in regulations and policy, the Commission first should have completed the updating of its health and safety regulations. Only after the regulations are properly updated will the Commission be in a position to reasonably evaluate whether the deployment of so-called “small” wireless facilities will promote the safety of life and property, as required by

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[11] Agency decisions resting on stale scientific data will be set aside as arbitrary and capricious. *Seattle Audobon Soc’y v. Espy*, 998 F.2d 699, 704 (9th Cir. 1993); *Desert Citizens of Am. v. Bisson*, 231 F.3d 1172, 1188 (9th Cir. 2000). Courts are all the more likely to deem agency actions relying on stale data arbitrary and capricious if, as is the case here, the agency has access to more current and accurate data. *Am. Horse Prot. Ass’, v. Lyng*, 812 F.2d 1, 6-7 (D.C. Cir. 1986) (holding agency’s action arbitrary and capricious for failure to consider an intervening study about inhumane treatment of horses); *Golden Northwest Aluminum, Inc. v. Bonneville Power Adm’n*, 501 F.3d 1037, 1052 (9th Cir. 2007) (holding that an agency should have considered “changed market conditions”); and *Northern Plains Resource Council Inc. v. Surface Transportation Board*, 668 F.3rd 1067 (9th Cir. 2011) (holding that reliance on ten year old aerial surveys was arbitrary and capricious).

Section 332(a)(1).[12]

B. The Commission's determination in the Order that the deployment of so-called "small" wireless facilities will not constitute "a major federal action" violates NEPA.

The Order states that the deployment of so-called "small" wireless facilities will not constitute "a major federal action" under Section 102(C) of NEPA and, therefore, will not require a pre-deployment environmental review. As discussed *infra*, the reason given to support this determination is that there will be only limited federal involvement in the deployment decision. The Commission accordingly amends Section 1.1312 of its regulations (47 C.F.R. § 1.1312) to exempt small wireless facilities on non-Tribal lands[13] from Section 1.1312's requirement of a pre-deployment review for facilities that "may have a significant environmental impact".

In support of its determination that so-called "small" wireless facilities are exempt from NEPA, the Commission points to the fact that it has previously promulgated regulations dispensing with site-specific construction licenses for small wireless facilities. In place of the site-specific construction licenses, the Commission has implemented regulations providing for geographic area licenses authorizing the use of spectrum. According to the Commission, issuance of site-specific construction licenses required pre-deployment NEPA reviews because those licenses authorized activities with foreseeable environmental impacts. The presence of foreseeable environmental impacts, the Commission finds, meant that the issuance of each site-specific construction license

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[12] The Intergovernmental Advisory Committee to the Federal Communications Commission made a similar recommendation in its Advisory Recommendation No. 2018-01, submitted in this proceeding on March 21, 2018.

[13] Unless stated otherwise, the term, "small wireless facilities", as used throughout this document, refers to small wireless facilities on non-Tribal lands that are subject to geographic area licensing but not subject to the Commission's antenna structure registration system. See Order at paras. 36 and 45.

was "a major federal action" significantly affecting the human environment. See 40 C.F.R. § 1508.18. Under NEPA, such major federal actions must be preceded by a meaningful environmental review that takes a "hard look" at the proposed action to inform agency decision-making. On the other hand, the Commission maintains that issuing geographic area spectrum licenses does not have foreseeable environmental impacts. The Commission maintains that: (a) it is not foreseeable from the issuance of a geographic area spectrum license that a licensee will actually construct and install wireless facilities; and (b) because the construction and installation of small wireless facilities are not foreseeable consequences of the geographic area spectrum license, issuance of the spectrum license does not involve significant federal involvement and thus does not constitute "a major federal action" triggering NEPA review.

Yet the Commission's NEPA analysis is incorrect. The Commission presents no explanation of why the Order itself (as distinct from subsequent actions licensing spectrum, discussed *infra*) is not a major federal action because it changes regulations and policy regarding the applicability of NEPA and creates a new exclusion from NEPA for an entire class of wireless facilities. There can be no question of substantial federal involvement since the Commission's action in the Order is what is at issue. Furthermore, as discussed *infra*, the record contains substantial evidence showing significant harm to the human environment from so-called "small" wireless facilities. The Commission should have fully considered this evidence before concluding that the facilities in question posed no objectionable environmental impact and were exempt from NEPA.

In this connection, the undersigned observes that the Commission could have undertaken a programmatic environmental review of the regulatory exemption before the

Order was issued.[14] As the Council on Environmental Quality (CEQ) stated in its Final Guidance regarding the use of Programmatic NEPA reviews, "[t]he analyses in a programmatic NEPA review are valuable in setting out the broad view of environmental impacts and benefits for a proposed decision such as a rulemaking, or establishing a policy, program, or plan."[15] Such a programmatic environmental review seems particularly appropriate in the present context. Among other considerations, the preparation of a programmatic environmental review would have given the Commission an opportunity to explore the record evidence of direct, indirect, and cumulative impacts of so-called "small" wireless facilities in residential communities. It also would have identified reasonable but less harmful or intrusive alternatives to the widespread deployment of small wireless facilities.[16] The failure of the Commission at a minimum to undertake such a programmatic review fails to follow the Final Guidance from CEQ, violates NEPA, is a failure of reasoned decision-making, and is arbitrary and capricious and unlawful.

Furthermore, the Commission's insistence that the issuance of geographic area spectrum licenses do not constitute "major federal actions" also is unpersuasive. Several commenters pointed to this legal infirmity. The National Resources Defense Council (NRDC), for example, pointed out that (1) NEPA applies to all "major federal actions"; (2) the regulations of the Council for Environmental Quality (CEQ) define "major federal action" as "projects or programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies"; (3) courts, including the U.S. Supreme Court

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[14] See, *Notice of Availability, Final Guidance for Effective Use of Programmatic NEPA Reviews*, issued by the Council on Environmental Quality, 79 FR 76986 (Dec. 23, 2014) (Final Guidance).
[15] *Id.*
[16] See discussion in Final Guidance of "reasonable alternatives." *Id.* at 76988—76989.

have regularly found that the issuance of a license is a "major federal action"; and (4) the Commission has applied NEPA to its licensing decisions since it began issuing licenses in 1974.

Notwithstanding these arguments, the Commission wrongly maintains that the extent of federal involvement in the issuance of spectrum licenses is not a major federal action under NEPA. As previously described, the premise of the Commission's reasoning is that there is no foreseeable environmental impact from the issuance of geographic area spectrum licenses because those licenses do not constitute site-specific authority to construct any particular small wireless facility. The Commission, however, misses the fact that, even setting aside other environmental impacts, the geographic area spectrum license constitutes authorization to emit high frequency RF radiation and this radiation poses a serious environmental threat to persons in residential areas where small wireless facilities will be deployed. There is no question about foreseeability in this circumstance because the authority to use spectrum is itself the cause of foreseeable environmental impacts and, therefore, the Commission has erred by determining that NEPA review is not required. In addition, as discussed *infra*, the Commission appears to be employing a strategy of segmentation in order to avoid meaningful NEPA review.

C. The Commission's exemption of so-called "small" wireless facilities from pre-deployment historic preservation review violates NHPA.

The Commission finds that a pre-deployment review of small wireless facilities on non-Tribal lands is generally not required by NHPA because the issuance of geographic area spectrum licenses is not a "federal undertaking," as defined in Section 3 of the National Historic Preservation Act (54 U.S.C. § 300320). "Federal Undertaking" includes a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including— (1) those carried out by or on behalf of the Federal agency; (2) those carried out with Federal financial assistance; (3) those requiring a Federal permit, license, or approval; and (4) those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency.[17]

The same legal infirmities that apply to the Commission's determination to exempt small wireless facilities from the requirement for pre-deployment NEPA review apply also to the Commission's determination that small wireless facilities should be excluded from pre-deployment NHPA review. The Commission has erred in not considering that the Order itself is a "federal undertaking" under the NHPA because it represents a federal action changing established regulations requiring NHPA review for an entire class of small wireless facilities. In addition, the Commission has erred in concluding that the issuance of geographic area spectrum licenses does not present foreseeable historic preservation impacts requiring pre-deployment historic preservation reviews. The Order, in short, violates NHPA just as it also violates NEPA.

D. The Commission erred in concluding that pre-deployment environmental reviews of so-called "small" wireless facilities are not consistent with the public interest.

The Order, at paragraph 39, concludes that pre-deployment environmental reviews of small wireless facilities are not consistent with the public interest. The Commission's public interest analysis in the Order is guided by the alleged economic and social benefits of the deployment of high frequency communications technologies versus

[17] The Commission maintains that, at least from an operational standpoint, the definition of "major federal action" under NEPA and "federal undertaking" under NHPA are co-extensive. It is not clear that this is the case, however.

the alleged costs and delays allegedly associated with environmental and historic preservation reviews.[18] The Commission is heavily swayed by concerns expressed by communications industry stakeholders with a pecuniary interest in seeing that small wireless facility deployment is expedited and uncritically accepts industry's benefit and cost claims. The Commission also gives uncritical credit to industry's claims that the number of public complaints regarding the impacts of small wireless facility installations has not been large.[19] On the basis of these factors, the Commission concludes that "small wireless facilities pose little or no risk of adverse environmental or historic preservation effects"[20] and, accordingly, pre-deployment environmental and historic preservation reviews of small wireless facilities do not serve the public interest.[21]

Missing from the Commission's review of comments is any meaningful consideration of the specific record evidence in this and connected actions of the significant potential negative environmental impacts from the planned deployment of small wireless facilities, particularly in terms of health and safety and aesthetic impacts on residential neighborhoods. The Commission's public interest analysis does not support its determination to do away with pre-deployment environmental and historic preservation reviews of so-called "small" wireless facilities. Because the Commission failed to review and seriously consider all relevant evidence, the Order's public interest

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[18] Order at para. 2 presents outsized estimates submitted by communications companies and their representatives of jobs that will be created by the deployment of 5G technologies. Order at para. 3 refers to the costs and delays allegedly associated with the regulatory process. Order at para. 11 summarizes additional cost claims submitted by communications companies. Also see Order at para. 44. The Commission does not provide any analysis of the basis for these claims.

[19] Order at para. 79.

[20] Order at para. 42.

[21] Order at para. 79.

analysis and the resulting determination to eliminate pre-deployment environmental are unlawful.

More specifically, there are several critical facts that the Commission failed to consider. There is ample record evidence submitted in this proceeding of negative impacts from the widespread deployment of so-called "small" wireless facilities. This evidence is presented in comments and attachments to comments filed in this proceeding, including references and electronic links contained therein to peer-reviewed scientific studies and letters from medical professionals. This documentation points to significant potential harm to the human body and brain functioning from RF radiation.[22] As discussed above, the Commission frankly states that it is not going to examine this evidence.

Furthermore, the Commission unlawfully has failed to consider relevant evidence submitted in connected actions.[23] There are two such connected actions: (1) the proceeding begun in 2013,[24] but never concluded, to review and update the RF emissions health and safety regulations promulgated in 1996;[25] those regulations, apparently based

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[22] See, e.g. Herbert, M.R. and Sage, C. "Autism and EMF? Plausibility of a Pathophysiological Link". Part 1: Pathophysiology , 2013, Jun;20(3):191-209, epub Oct 4, PMID 24095003. Pubmed abstract for Part 1. Part II: Pathophysiology, 2013 Jun;20(3):211-34. Epub 2013 Oct 8, PMID 24113318. Pubmed abstract for Part II, which are summarized in the submission of the Environmental Health Trust, filed June 7, 2017 in this proceeding.

[23] The scope of an agency's NEPA review must include "connected actions". 40 C.F.R. §1508.25(a)(1). Actions are "connected" if they trigger other actions, cannot proceed without previous or simultaneous actions, or are "interdependent parts of a larger action and depend on the larger action for their justification." 40 C.F.R. §1508.25(a)(1)(iii). As discussed in this Request for Reconsideration, neither the current proceeding nor the proceeding approving the use of higher frequency mmW spectrum can reasonably proceed to conclusion without the Commission first or concluding the proceeding begun in 2013 to update its RF regulations. The proceeding to update the RF regulations is the "larger proceeding" on which the other two proceedings depend for their justification. Moreover, the same considerations which require review of connected actions for purposes of NEPA apply equally to the Commission's public interest analysis.

[24] See note 7 *supra*.

[25] *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, Report and Order, ET Docket No. 93-62 (adopted August 1, 1996; released August 1, 1996). See, 61 FR 41006 (August 7, 1996).

on standards established in 1992,[26] are out of date but the Commission appears to be unnecessarily delaying its updating of those regulations while hastily moving ahead with efforts to expedite the deployment of small wireless facilities in residential neighborhoods; and (2) the order issued in 2016 in which the Commission for the first time sanctioned the use of higher frequency RF bands while ruling that health and safety concerns were beyond the scope of its decision and would have to wait until the review and update proceeding begun in 2013 was concluded.[27]

E. The Commission appears to be employing a strategy of unlawful segmentation in order to avoid meaningful NEPA review.

In failing to consider the above evidence submitted in this proceeding and in the two other connected actions, the Commission has fallen short of well-established standards of reasoned decision-making necessary to establish that it has acted in the public interest. Indeed, taking the current proceeding and the two other connected actions together, it appears that the Commission is engaged in a strategy of segmenting connected actions for the purpose of evading meaningful environmental review. This segmentation strategy is a clear violation of NEPA.[28] It also is a violation of the

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In this proceeding, the Commission adopted recommended Maximum Permissible Exposure limits for field strength and power density for the transmitters operating at frequencies of 300 kHz to 100 GHz. In addition, the Commission adopted the specific absorption rate (SAR) limits for devices operating within close proximity to the body as specified within the ANSI/IEEE C95.1-1992 guidelines.

26 *Id.*

27 *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, et seq.*, GN Docket No. 14-177, *et seq.,* Report and Order and Notice of Proposed Rulemaking (adopted July 14, 2016, released July 14, 2016), published in the Federal Register at 81 FR 58270 (August 24, 2016) at paragraph numbers 356 through 363 (expressly deferring consideration of health and safety impacts).

28 It is unlawful for agencies to evade their responsibilities under NEPA by artificially dividing a major federal action into smaller components, each without significant impact. *O'Reilly v. U.S. Army Corp. Engineers,* 950 F.2d 1129 (5th Cir. 2007).

Commission's responsibility to serve the public interest. In order to cure this violation, the Commission must complete its reassessment of the RF health and safety regulations begun in 2013 and factor those standards into both its 2016 decision permitting the use of higher frequency RF bands and the Order at issue in this proceeding.

F. The Commission Errs In Concluding That Pre-Deployment Environmental Reviews Will Provide Only *De Minimis* Benefits And In Suggesting That Existing RF Health and Safety Regulations Are Adequate To Protect The Public Interest.

The Commission indicates, at paragraph 63 of the Order, that existing RF health and safety regulations will continue to apply regardless of the fact that pre-deployment environmental reviews will no longer be required. At paragraph 79, the Order concludes that the benefits of pre-deployment environmental reviews will be *de minimis*. Also, at paragraph 92, the Order states that the deployment of small wireless facilities are "inherently unlikely" to trigger environmental concerns.

The Commission apparently has concluded that individuals are not significantly put at risk by network densification of small wireless facilities in residential communities, that those who might justifiably be concerned over the health and safety impacts can reasonably rely for protection on the Commission's existing RF regulations, and that little, if anything, would be gained by requiring pre-deployment environmental reviews. But as discussed above, the existing RF safety regulations are based on standards developed in 1992 and the regulations were promulgated in 1996. They clearly need to be re-examined and updated, as evidenced by the Commission's establishment of a proceeding to do just that in 2013. Asking the public to rely on those outdated standards is asking the public to take an unwarranted risk. Moreover, after-the-fact legal actions to cure environmental injuries are no substitute for pre-deployment environmental reviews based on updated standards. The Commission in fact recognized in a 1990 Order that its "responsibility under the environmental laws is to consider potential harm to the environment before it occurs, not simply to await environmental damage and then attempt to rectify it."[29] Failing here to recognize the advantages to the public welfare of pre-deployment environmental reviews is contrary to the public interest. Indeed, as a practical matter, it is likely to prove extremely harmful to some individuals who suffer real harm from small cell network densification: in the absence of pre-deployment environmental reviews and up-to-date health and safety regulations, the injuries sustained by these claimants will continue to grow while their claims are pending resolution; those injuries might be avoided altogether if there were pre-deployment environmental reviews that incorporated up-to-date health and safety regulations.

Moreover, pre-deployment environmental reviews, possibly a programmatic review, and the development of up-to-date uniform standards for small wireless facilities would actually benefit both communications companies and individual residents. It would minimize uncertainties for both sides by easing concerns over the plans for deployment and would reduce the likelihood that residents will pursue hundreds, if not thousands, of individual claims of environmental degradation, claims of health and safety rule violations, or other claims of uncompensated takings of property. Both sides thus would benefit and, therefore, the public interest, convenience, and necessity would be better served.

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[29] *Amendment of Environmental Rules*, First Report and Order, 5 FCC Rcd 2942, 2943, para. 10 (1990) (*1990 Order*).

G. The Commission Errs In Suggesting That State And Local Laws And Regulations Are Adequate To Protect The Public Interest From Environmental Impacts Of Small Wireless Facilities.

The Commission advises at paragraph 77 of the Order that, even in the absence of federal pre-deployment environmental reviews, state and local laws and regulations still will reduce the likelihood of adverse impacts from small wireless facilities. On the other hand, the Commission acknowledges at note 153 of the Order that existing limits on state and local laws will not provide the same scope of protection as would pre-deployment reviews. The Commission additionally acknowledges at note 58 of the Order that federal authority has generally pre-empted conflicting regulations by state and local authorities. At note 153, the Order describes the extent to which state and local governmental regulations vary from jurisdiction to jurisdiction. These variations in large measure appear to be due to differences in the interpretation of the extent of federal pre-emption.

Given these limits on state and local authorities and the differing understandings of what authority remains for state and local agencies, the Commission's refusal to wield federal authority to ensure a uniform review of environmental and historic preservation impacts of small wireless facility deployments does not serve the public interest and is unreasonable. In this respect, the Commission is failing to carry out its statutory mandate to protect the public safety. See note 53 of the Order. The Commission's Order gives undue weight to the second of these two mandates at the expense of the first. The result is not in the public interest, convenience, and necessity, and, therefore, is unlawful.

V. Request for a Stay

Given the actions taken by the Commission to date, hundreds of thousands of small wireless facilities may be deployed in residential neighborhoods across the nation and emitting high frequency radiation into peoples' homes by the time the Commission completes its review of health and safety regulations. Thus, by promoting the rapid deployment of high frequency technologies at the expense of public wellbeing, the Commission has violated the public trust in government and, as a legal matter, has acted contrary to the Communications Act, NEPA, NHPA, and the public interest. The evidence of record raises substantial concerns over the impact of deployment of so-called "small" wireless facilities on human health and safety and the environment. The threatened injuries cannot be fully repaired once inflicted. The Commission should stay the effectiveness of its Order pending issuance of a decision on this Request for Reconsideration.

Section 1.429(k) of the Commission's rules, 47 CFR § 1.429(k), permits the agency for good cause to stay the effective date of a rule pending a decision on a request for reconsideration.[30] In determining whether to stay the effectiveness of one of its orders, the Commission applies the traditional four-factor test established by the U.S. Court of Appeals for the District of Columbia Circuit ("D.C. Circuit").[31] To qualify for a stay, a petitioner must show that: (1) it is likely to prevail on the merits; (2) it will suffer irreparable harm absent the grant of preliminary relief; (3) other interested parties will not be harmed if the stay is granted; and (4) the public interest favors grant of the stay. The

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30 *Order Granting Stay Petition in Part*, Protecting the Customers of Broadband and Other Telecommunications Services, WC Docket No. 16-106 (adopted and released March 1, 2017) at 3-4.

31 *Id.* (citing *Washington Metro. Area Transit Comm'n v. Holiday Tours, Inc.*, 559 F.2d 841, 843 (D.C. Cir. 1977) (Holiday Tours); *Virginia Petroleum Jobbers Ass'n v. Federal Power Comm'n*, 259 F.2d 921, 925 (D.C. Cir. 1958) (VA Petroleum Jobbers)).

Commission's consideration of each factor is weighed against the others, with no single factor dispositive. Thus, "injury held insufficient to justify a stay in one case may well be sufficient to justify it in another, where the applicant has demonstrated a higher probability of success on the merits."[32]

The preceding discussion in support of this Request for Reconsideration, hereby incorporated by reference, also establishes "good cause" to support a stay of the Order pending issuance of a further decision on reconsideration. This is borne out by applying the four-factor test, as follows:

A. The undersigned is likely to prevail on the merits of the issues.

The arguments and facts presented above all contribute to the conclusion that the undersigned is likely to prevail on the merits of the issues in an appeal of the Order. Of these arguments, all count but a few warrant special mention.

First, the Commission, by rule amendment, has attempted in the Order to create a new class of wireless facilities exempt from NEPA and NHPA without a meaningful review of the environmental (including health and safety) impacts and historic preservation impacts of its action. The Order posits that this change in regulations is warranted apparently because so-called small wireless facilities are unlikely to have much of an impact on the locations in which they are placed. The Commission appears to have assumed the result that it uses to justify the action, *i.e.* it has assumed that there will be no impacts and this supports the conclusion that it

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32 Id. (citing *VA Petroleum Jobbers*, 259 F.2d at 925; and *Holiday Tours*, 559 F.2d at 844).

is unnecessary to conduct a meaningful impact analysis. The undersigned submits that a reviewing Court would not sustain such circular reasoning.

Second, the fact that the Commission has ignored substantial evidence of record of significant environmental impacts, including deleterious health and safety impacts, lends further support to the likelihood of prevailing on the merits in any court appeal.

Third, so too, does the fact that the Commission appears to be engaged in a strategy of unlawful segmentation, a clear violation of NEPA that a reviewing court is unlikely to sustain.

Fourth, an appeal is even more likely to prevail when a court considers that the Commission is continuing to rely on outdated health and safety regulations developed on stale scientific data; reliance on such stale data is a clear indication that the Commission's action is arbitrary and capricious. A reviewing court is likely to be swayed by this fact, especially because the outdated regulations expose the public to unknown risks from high frequency RF radiation when the Commission could have prevented that situation by completing the updating of its regulations begun in 2013.

B. Absent grant of a stay, the petitioner will suffer irreparable harm.

As discussed above, so-called "small" wireless facilities pose a threat of irreparable harm to the human environment, including the health and safety of residents in communities in which the facilities are placed. This threat is specific to the undersigned. He is a resident of Montgomery County Maryland and communications companies are presently proposing to place small wireless facilities approximately sixty feet from his family's home. The undersigned has appended to this pleading an affidavit attesting to his observation of the plans for this installation. Said installation poses the threat of irreparable injury to the undersigned and to his family and neighbors.

C. Other interested parties may be harmed if the stay is granted but this harm is outweighed by the irreparable harm to the public if the stay is not granted.

The business interests supporting the deployment of so-called "small" wireless facilities will likely suffer some pecuniary harm if the stay is granted. Persons desirous of access to next generation wireless communications may also be mildly harmed as they will have to continue to put up with existing communications devices. It is not clear in either case, however, that this harm will be significant since the stay will terminate upon the issuance of a decision on this Request for Reconsideration. Any such harm from granting the stay will be outweighed by the irreparable harm occasioned by not granting the stay.

D. The public interest favors grant of the stay.

The arguments and facts presented in this Request for Reconsideration clearly demonstrate that the Commission's Order is not consistent with the public interest. The public interest requires that the Commission complete the updating of its health and safety regulations and also perform a full environmental review of its proposed action before deployment of so-called "small" wireless facilities commences. This is particularly true of deployment in residential communities. Accordingly, for all of the reasons presented herein, the public interest favors grant of the stay.

VI. Conclusion

For the reasons set forth above, the undersigned residents of the United States request the Commission to reconsider the Order herein. In order to avoid irreparable injury, the undersigned also ask the Commission to stay the effectiveness of the Order until the agency has completed the updating of its RF health and safety regulations and has performed a full environmental review of the environmental and historic preservation impacts of small wireless facilities.

Respectfully submitted,

Edward B. Myers
14613 Dehaven Court
North Potomac, MD 20878
Phone: (717) 752-2032
Email: edwardbmyers@yahoo.com

DATED: May 29, 2018

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:

Accelerating Wireless Broadband Deployment by Removing Barriers To Infrastructure Investment	)))	WT Docket No. 17-79

AFFIDAVIT OF EDWARD B. MYERS

State of Maryland, Montgomery County

1. I, Edward B. Myers, attest that my statements are true to the best of my knowledge.
2. I reside at 14613 Dehaven Court, North Potomac, MD 20878 in Montgomery County, Maryland. My wife also occupies this residence and we take care of our grandson at this location five days per week.
3. Crown Castle, a provider of wireless infrastructure, has installed a platform within approximately sixty feet of my home with the apparent intent of later placing a cell tower and associated equipment at the site.
4. The said site is situated in direct line of sight to my home.
5. If one or more wireless antennas are placed at a cell tower on the site, radiofrequency (RF) emissions are very likely going to be directed into my home. I have no present means of preventing this from occurring. Said radiation is likely to be harmful to my health and safety and that of my family.

6. Any harm to my health and safety or that of my family due to RF emissions will be irreparable.

Respectfully submitted,

Edward B. Myers

Edward B. Myers
14613 Dehaven Court
North Potomac, MD 20878